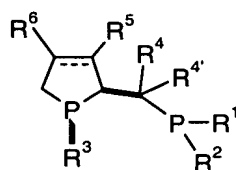


Abstract

The invention is concerned with new phosphine ligands of formula I



I

wherein

R¹ and R² are independently of each other unsubstituted alkyl, aryl, cycloalkyl or heteroaryl, or alkyl, aryl, cycloalkyl or heteroaryl each of which independently is substituted by alkyl, alkoxy, halogen, hydroxy, amino, mono- or dialkylamino, aryl, -SO₂-R⁷, -SO₃⁻, -CO-NR⁸R^{8'}, carboxy, alkoxycarbonyl, trialkylsilyl, diarylalkylsilyl, dialkylarylsilyl or triarylsilyl; R³ is alkyl, cycloalkyl, aryl or heteroaryl; R^{4'} and R⁴ are independently of each other hydrogen, alkyl or optionally substituted aryl; or R^{4'} and R⁴ together with the C-atom they are attached, form a 3-8-membered carbocyclic ring; dotted line is optionally a double bond; R⁵ and R⁶ are independently of each other hydrogen, alkyl or aryl, R⁷ is alkyl or aryl; and R⁸ and R^{8'} are independently of each other hydrogen, alkyl or aryl; the substituents attached by the bold bonds are in *cis* relation to each other; metal complexes with such ligands in asymmetric reactions.

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